

of the device. It should be noted that “physical configuration” refers to the present layout of the physical device (e.g., portrait, landscape, or closed), and not to the general orientation of the device (e.g., horizontal or vertical to the ground as determined by a gravity or acceleration sensor).

**[0042]** FIG. 6 is a flow chart of an exemplary process for changing the mode of operation based on the physical configuration of a multi-configuration device. When the physical configuration of the device is changed (e.g., between the portrait configuration and landscape configuration as described above), the state of one or more of the Hall-effect switches changes due to changes in magnetic field locations (step S10). The output signals of the Hall-effect switches are supplied to logic circuitry. When the state of one or more of the switches changes, the logic circuitry generates an interrupt that is supplied to one or more processors (or controllers) of the device (step S12). The interrupt alerts the processors of the new physical configuration and they react by changing the operating mode of the device. For example, changing the operating mode of the device 100 can include altering any or all of the inputs 106, the display 108, the active software applications, the operating system, the drivers, and so on.

**[0043]** In the exemplary process of FIG. 6, when a portrait interrupt is generated, the keypad is set to function as a numeric keypad (step S14). In preferred embodiments, the keypad is an adaptable keypad having keys that are each capable of displaying and functioning as multiple characters (e.g., the E-INK keypad available from the assignee of the present invention). Such adaptable keypads are described in greater detail in U.S. Patent Application Publication No. US 2003/0058223, which is hereby incorporated by reference. In response to the portrait interrupt, the processor sets a flag. This causes the adaptable keypad to display the standard characters of a numeric keypad with a portrait orientation as illustrated in FIG. 1, and the keypad driver to interpret key presses as the displayed characters.

**[0044]** Additionally, when a portrait interrupt is generated, the display is set to portrait view so that the orientation of the display matches the physical configuration of the device (step S16). In preferred embodiments, the display is a conventional LCD display that can be switched between a portrait view in which the displayed image is presented in a portrait format (i.e., the vertical dimension is greater than the horizontal dimension) and a landscape view in which the displayed image is presented in a landscape (or panoramic) format (i.e., the horizontal dimension is greater than the vertical dimension). In response to the portrait interrupt, the display driver formats or reformats the displayed image for the aspect ratio of the portrait view. This image is then displayed with the correct orientation so as to match the physical configuration of the device in portrait mode.

**[0045]** Further, when a portrait interrupt is generated, the active software application is changed to a phone application (step S18). In preferred embodiments, the phone application is any number of a phone dialer application, an address book application, and a camera application. In response to the portrait interrupt, the software that is currently active on the device is automatically switched so that the device begins functioning as a cellular phone. Thus, changing the physical configuration of the device to the portrait configuration generates a portrait interrupt that causes the keypad, display,

and active software application to automatically switch so that the device functions as a standard cellular phone.

**[0046]** Similarly, when a landscape interrupt is generated, the keypad is set to function as a text or “QWERTY” keypad (step S20). In preferred embodiments, the processor sets a flag in response to the landscape interrupt. This causes the adaptable keypad to display the standard QWERTY characters of a text keypad with a landscape orientation as illustrated in FIG. 2, and the keypad driver to interpret key presses as the displayed characters.

**[0047]** Additionally, when a landscape interrupt is generated, the display is set to landscape view so that the orientation of the display matches the physical configuration of the device (step S22). In preferred embodiments, the display driver formats or reformats the displayed image for the aspect ratio of the landscape view in response to the landscape interrupt. This image is then displayed with the correct orientation so as to match the physical configuration of the device in landscape mode.

**[0048]** Further, when a landscape interrupt is generated, the active software application is changed to a text application (step S24). In preferred embodiments, the text application is any number of a text-messaging application, a notepad application, a spreadsheet application, an organizer application, a media player application (such as an MP3 or video player), and a game application. In response to the landscape interrupt, the software that is currently active on the device is automatically switched so that the device begins functioning as a text messaging pager, a PDA, a handheld computer, a media player, or the like. Thus, changing the physical configuration of the device to the landscape configuration generates a landscape interrupt that causes the keypad, display, and active software application to automatically switch so that the device functions as a text (non-phone) device such as text messaging pager or PDA.

**[0049]** When a closed interrupt is generated, the device enters a standby mode or is turned off in order to conserve battery power (step S30).

**[0050]** Thus, a change in the physical configuration of the device causes a change in the activation states of the sensing switches. This, in turn, causes the logic circuitry to generate an interrupt that changes the operating mode of the device.

**[0051]** In preferred embodiments of the present invention, this mode change is done “on the fly”. In particular, the operation of the inputs, display, and software is changed automatically without the need to load or reload the operating system, drivers, or software applications. Furthermore, the processors of the device do not have to continuously monitor sensing switches for the present physical configuration state of the device. Rather, mode changes are interrupt driven with any change in the physical configuration of the device causing an interrupt to be supplied to the processors. However, in further embodiments, the operating system and/or drivers are also changed in response to a change in the physical configuration of the device. Similarly, in some embodiments, the applications are loaded as-needed, instead of all being preloaded and just switching the presently active application.

**[0052]** While the keypad is the input device that is changed in the exemplary embodiment of FIG. 6, in further embodiments other or different inputs can be changed. For